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also spelled haptene small molecule that stimulates the production of antibody molecules only when conjugated to a larger molecule called a carrier molecule.

The term **hapten** is derived from the Greek *haptein*, meaning "to fasten." Haptens can become tightly fastened to a carrier molecule most often a protein, by a covalent bond. The hapten-carrier complex stimulates the production of antibodies, which the unbound hapten cannot do, and becomes immunogenic (capable of eliciting an immune response). The hapten then reacts specifically with the antibodies generated against it to produce an immune or allergic response. Thus, although the hapten cannot elicit an antibody response on its own, it can bind with antibodies and act as an antigen. In the early part of the 20th century, immunologist Karl Landsteiner exploited the antigenic quality of synthetic haptens to study the highly specific way in which antibodies bind to antigens.

Many drugs that cause allergic reactions, such as penicillin, act as haptens. When injected or ingested, penicillin reacts chemically with proteins in the body to form a hapten-carrier complex that can lead to the life-threatening syndrome called anaphylaxis. Other haptens include synthetic substances, such as the organic compounds benzyl aryl sulfonate or trinitrophenol, and naturally occurring polysaccharides such as lactose. Researchers have used haptens to construct synthetic vaccines to immunize people against various infectious organisms.

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MAASIMI.
"Hapten." Encyclopædia Britannica. 2003. Encyclopædia Britannica Online.
22 Aug. 2003 <<http://www.search.eb.com/eb/article?eu=40003>>.